Travel Model Two Development: Revised Representation of Space

Technical Paper

Metropolitan Transportation Commission with Parsons Brinckerhoff, Inc.

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1 Overview

MTC is rebuilding the representation of supply in our travel model. When complete, the representations of space, roadways, transit service, sidewalks, and bicycle ways will become part of the *Travel Model Two* modeling system. For an overview of the *Travel Model Two* model design, please see *Travel Model Two: Strategic Supply Design*.

As described in *Travel Model Two: Initial Representation of Space*, *Travel Model Two* has two, nested zone systems. The first and larger system is used to represent the movement of automobiles and its units are referred to as "travel analysis zones" or TAZs. The second and smaller system is used to represent the movement of people (as well as the short-distance movement of automobiles) and its units are referred to as "micro-analysis zones" or MAZs.

Based on feedback from our partner agencies, a final representation of space was developed. Table 1 summarizes, by county, the number of zones before and after the revisions. In every county, the number of TAZs either stayed the same or increased, while the number of MAZs decreased.

An interactive map of the boundaries is available on the MTC/ABAG Analytical Modeling Wiki.

Table 1: Number of Zones Before (Version 0) and After (Version 1) Revisions

| County	TAZs		MAZs	
	Version 0	Version 1	Version 0	Version 1
Alameda	1,020	1,093	14,022	8,635
Contra Costa	619	621	12,421	5,921
Marin	172	202	2,512	1,424
Napa	98	99	1,351	963
San Francisco	573	633	5,140	4,148
San Mateo	408	410	7,209	4,458
Santa Clara	1,002	1,011	12,869	8,519
Solano	266	268	5,280	2,823
Sonoma	351	351	5,431	2,894
Totals	*4,509*	*4,688*	*66,235*	*39,785*

2 MAZ Revisions

MTC's member counties reviewed the initial set of MAZs and provided feedback. While not every suggested revision was executed, the following general revisions were made:

1) Remove zones with a high area to length ratio that are common along highway corridors (slivers)
2) Remove zones with very little households or employment
3) Remove very small zones with little households or employment

The general reduction in the number of MAZs is shown in the Figure 1 below. The MAZs still retain a spatial granularity far greater than the TAZs, while at the same time the dependence on the odd shaped Census block geography has been largely removed. The dense areas continue to have many MAZs and the odd shaped MAZs along highways and roadways have been largely removed.

Figure 1 – Example MAZ Revisions
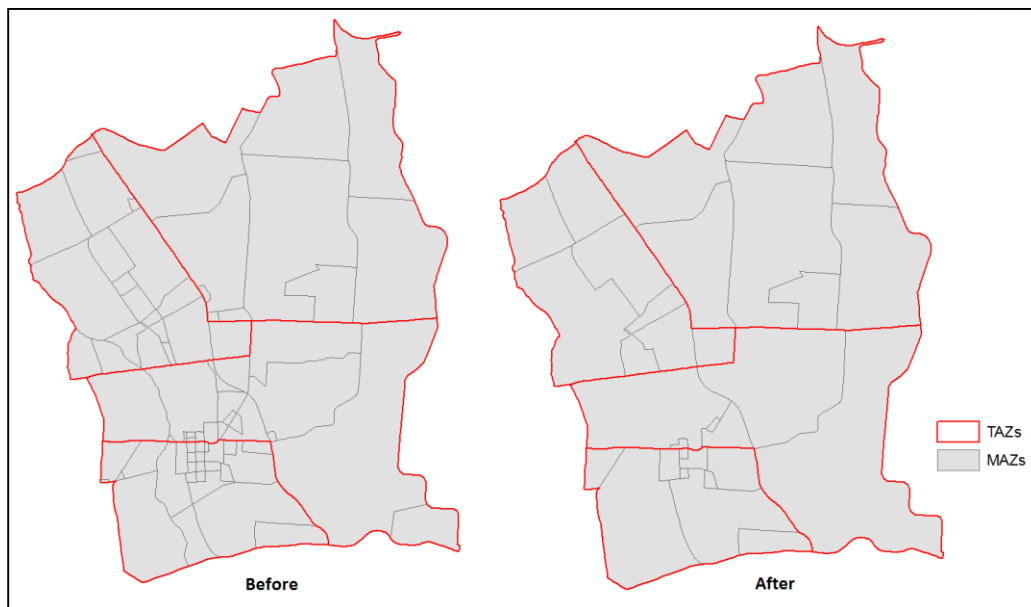
The process to revise the MAZ was as follows:

1) MAZs were spatially aggregated to remove most of the sliver zones and very small zones. The ArcGIS Eliminate tool was used to merge these zones with neighbor zones. MAZs were only merged within TAZ boundaries. The selection criteria below were used to select the MAZs to merge. The criteria includes three parts: 1) small zones with little households and employment, 2) very small zones with a bit more households and employment, and 3) sliver zones with a high shape area to length ratio.

   ```
   ("HH" < 25 AND "EMP_TOTAL" < 25 AND "AREA" < 10000000)  OR ("HH" <
   100 AND "EMP_TOTAL" < 100 AND "AREA" < 100000) OR (("Shape_Area"/
   "Shape_Length") < 45)
   ```

2) MAZ boundaries were revised (mostly split) to ensure the zones do not cross Census 2000 PUMA boundaries.
3) The X, Y centroid coordinate of the remaining (aggregated) MAZs was calculated and the Cube network node coordinates were updated.
4) The MAZ centroid connectors for the deleted MAZs were re-assigned to their new aggregate MAZ centroid (the one to which the deleted MAZ was merged into) in the Cube network.
5) MAZ nodes which were deleted during the aggregation process were deleted in the Cube network.

3 TAZ Revisions

MTC's member counties reviewed the initial set of TAZs and provided feedback. While not every suggested revision was completed, the following general revisions were made:

1) New TAZs were created based on the comments from the partner agencies. The key revisions were to split TAZs and also add new TAZs based on the shapefiles provided by the partner agencies.
2) TAZ boundaries were revised (mostly split) to ensure the zones mostly align with Census 2000 PUMA boundaries.

An example of the TAZ revisions is shown in the figure below. The overall number of TAZs is roughly the same. However, some of the TAZs were split to accommodate different land uses, roadways, and other spatial characteristics that impact auto travel behavior. The third map illustrates a revision to the TAZ boundaries in order to better match the PUMAs. The boundaries are not perfectly aligned since the TAZs are aggregates of MAZs, which are aggregates of Census blocks.

Figure 2 – Example TAZ Revisions
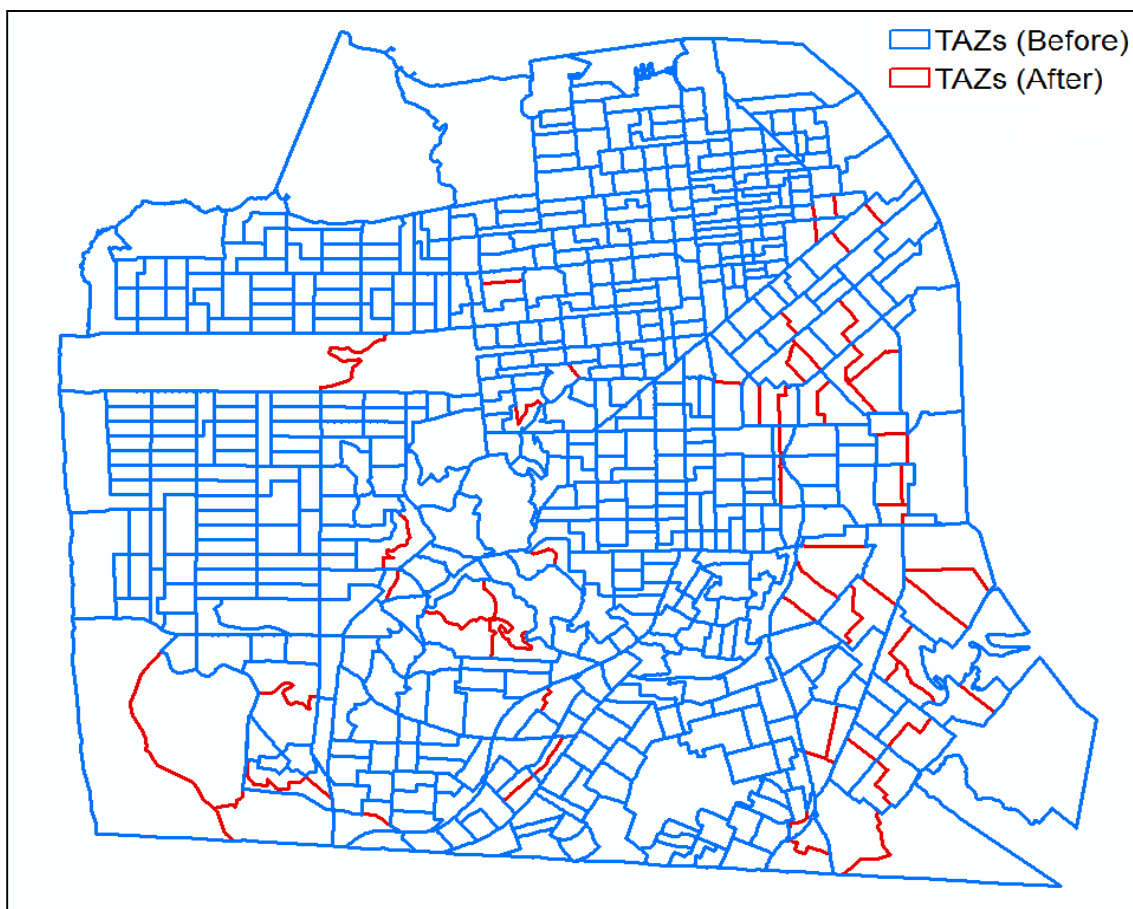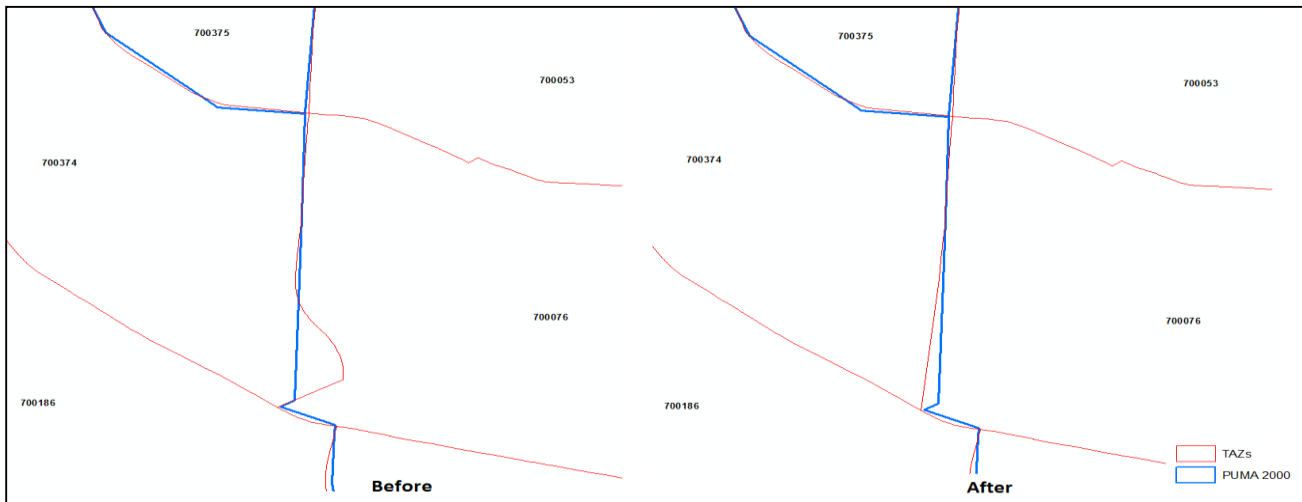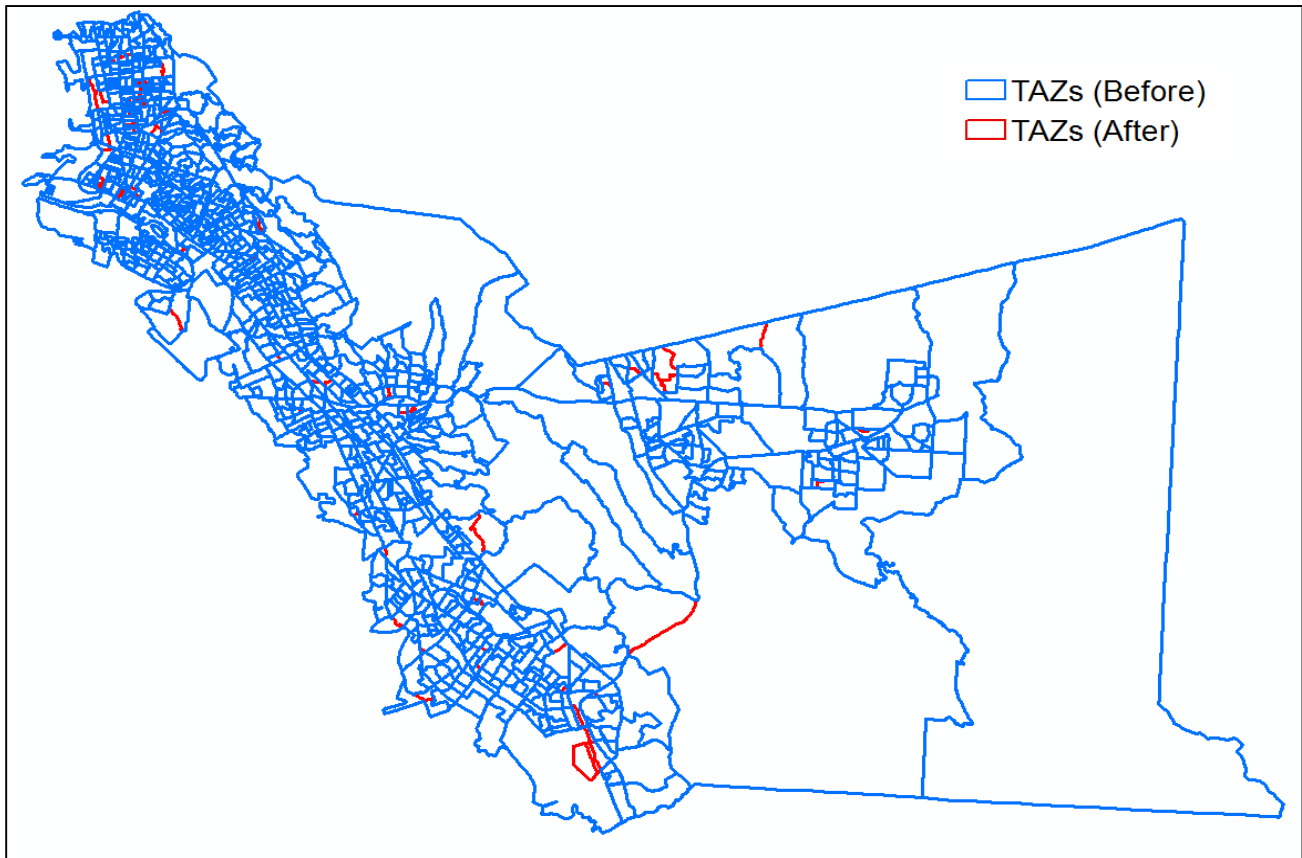
The process to revise the TAZ was as follows:

1) New TAZs were created by assigning a new TAZ number to the set of MAZs assigned to the new TAZ. The county zone numbering system was followed when creating new zones.
2) The X, Y centroid coordinates for the new TAZs was calculated.
3) Coordinates for the initial TAZ centroid nodes in the Cube network were updated.
4) The newly created TAZ centroid nodes were added to the Cube network.
5) The TAZ centroid connectors were revised in the Cube network by either adding new connectors or revising the network connections due to the revised zone shape.